

MICROHABITAT UTILIZATION IN JUVENILE *Deinopis* MACLEAY, 1839 (ARANEAE: DEINOPIDAE)

Yogendra Satam, J. Ahmed*, R. Khalap and K. Mohan*****

A/3-25, Police Camp, Marol Maroshi Road, Andheri (East), Mumbai 400059.
nannusatam@gmail.com

*Panchavati Housing Society, Building No. A/3, Flat No. H/8, Opp. Police Camp,
Vijay Nagar, Marol Maroshi Road, Andheri (East) Mumbai 400059.
curiocritters@gmail.com

**5 - A, Sagar Sangeet, 58 Shahid Bhagat Singh Marg, Colaba, Mumbai: 400005.
rajashree.khalap@gmail.com

***Prabhu Hospital, Hospital Cross Road, Moodubidire - 574227, India.
drkrishi@gmail.com

ABSTRACT

The utilization of naturally occurring, organic elements in the micro-habitat of juvenile *Deinopis* MacLeay, 1839 is reported for the first time, with additional notes on the behavior of the spiderlings.

Key Words: Deinopidae, *Deinopis*, India, Maharashtra, Mumbai, Aarey Milk Colony, Behavior, Natural History.

INTRODUCTION

Members of the family Deinopidae C. L. Koch, 1850 are renowned for their rarity, unique morphology, and remarkable prey capture techniques (Coddington *et al.*, 2012)

These spiders hunt utilizing a highly extensible, compact cribellate web, tenably homologous to a reduced orb web, constructed during hours of nocturnal hunting activity, held at four corners by the first two pairs of legs, and actively manipulated to ensnare passing pedestrian prey, visually detected and captured using a swift, forward strike, as well as aerial prey, discerned using airborne vibrations, and ensnared with a backward strike (Getty and Coyle, 1996; Coddington and Sobrevila, 1987).

Possessing perhaps, the largest simple eyes found in any terrestrial invertebrate (Blest and Land, 1977), *Deinopis* species are capable of rapidly synthesizing and degenerating the photoreceptor membranes found in their posterior median eyes, in sync with their circadian rhythm (Blest, 1978).

Divided amongst two genera, the smaller *Menneus* Simon, 1876 is confined to the old world sub-tropics, while the larger *Deinopis* MacLeay, 1839 is pantropical (Coddington *et al.* 2012), consisting of 47 nominal species (World Spider Catalog, 2015), only six of which have been appropriately defined from Asia (Leong and Foo, 2009), with only two being hitherto described from India, namely *D. goalparaensis* Tikader and Malhotra, 1978 and *D. scrubjunglei* Caleb & Mathai, 2014, from Jamduar, Goalpara district, Assam, in north - eastern India and Chennai, Tamil Nadu, in south India respectively, and Kanha tiger reserve, in Madhya Pradesh, Central India (Dhamorikar and Gore, 2014).

The present report marks the first time the genus has been formally reported from Mumbai, Maharashtra, in Western India.

METHODOLOGY

Living spiders were photographed using a Canon EOS 550D, with an 18-55mm lens. Two spiderlings were collected, euthanized, preserved in 80% ethanol and deposited in the repository of the Bombay Natural History Society, with the measurements provided being in mm and taken using a dial caliper.

Morphometric details and specimen registration numbers are as follows:

BNHS Sp. 262: Prosoma 2.26mm long, 1.72mm wide; Opisthosoma 4.77mm long, 0.96 mm wide; Total length (excluding legs) = 7.03mm

BNHS Sp. 263: Prosoma 1.80mm long, 1.36 mm wide; Opisthosoma 4.88mm long, 1.22 mm wide; Total Length (excluding legs) = 6.68mm

OBSERVATIONS

While *Deinopis* spiderlings were recorded on at least two occasions (February and March, 2014), during opportunistic surveys conducted to document the Araneae of Aarey Milk Colony, a 4000 acres eclectic mix of highly varied ecosystems, predominated by cultivated grassland, interspersed with wooded scrub and shrubland, 6 spiderlings found inhabiting thorny bushes in an area spanning around 20 x 10 ft. were observed with relative regularity, over a period of two months, between January and February, 2015.

The spiderlings were noted to become active shortly before dusk, though the hunting stance was not assumed until well after sunset (Figure 1, 2).

Clusters of debris composed of *Delonix regia* (Boj. ex Hook.) Raf. leaflets and twigs, shed from the trees growing directly overhead were found to form small mounds on the bushes, and these were utilized by the spiderlings as resting spots during hours of diurnal inactivity (Figure 3). In at least four spiderlings observed preparing to assume a cryptic posture, as dawn approached, these clusters were preferred to the branches and stems of the bushes they inhabited, with the specialized cribellate web used for ensnaring prey, either discarded (Figure 4) or consumed (Figure 5).

All three cryptic, anti-predator postures known to be assumed by members of the genus were exhibited by the spiderlings, namely (a) pressed flat against a branch (Figure 6), (b) suspended head downward in midair, with legs extended away from the longitudinal axis of the body in four tight pairs, forming a cross (Figure 7), or (c) hanging head downward in midair, with legs I and II protracted and apposed in front and legs III and IV protracted and apposed behind the body to form a single linear 'stick' (Figure 8).

It was found that (a) and (b) were favored during periods of diurnal inactivity, whereas (b) and (c) were more likely to be assumed under duress.

Moreover, the spiderlings were found to resemble bits of shrubbery, even while hunting (Figure 9, 10).

In one particular instance, a single specimen unwittingly disturbed during a photography endeavor and which had promptly proceeded to assume a cryptic, anti-predator posture similar to one adopted during daytime (a combination of a and b), was observed lunging at passing insect prey, and missing it, despite the cribellate cast-web being abandoned when the spider was unsettled.

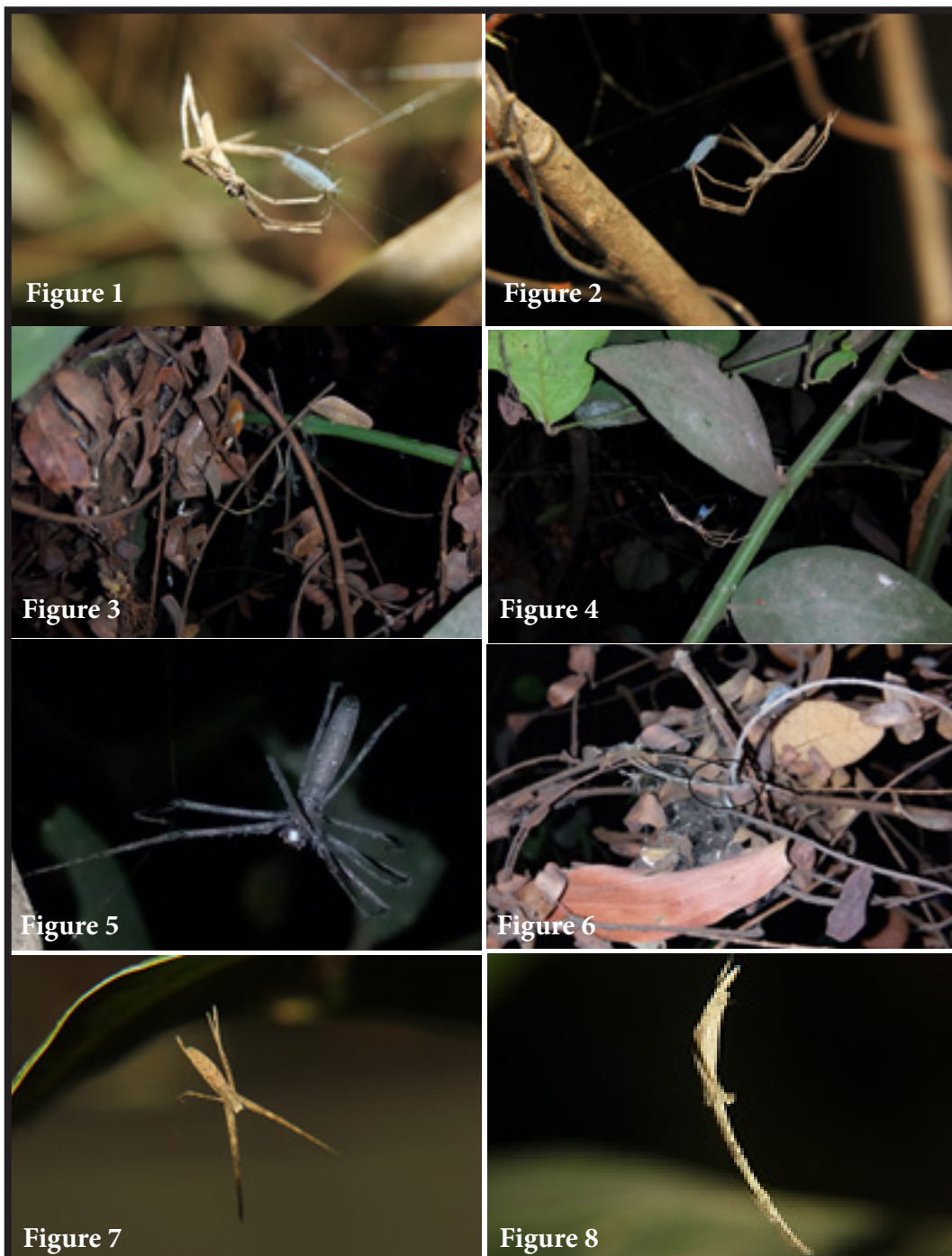
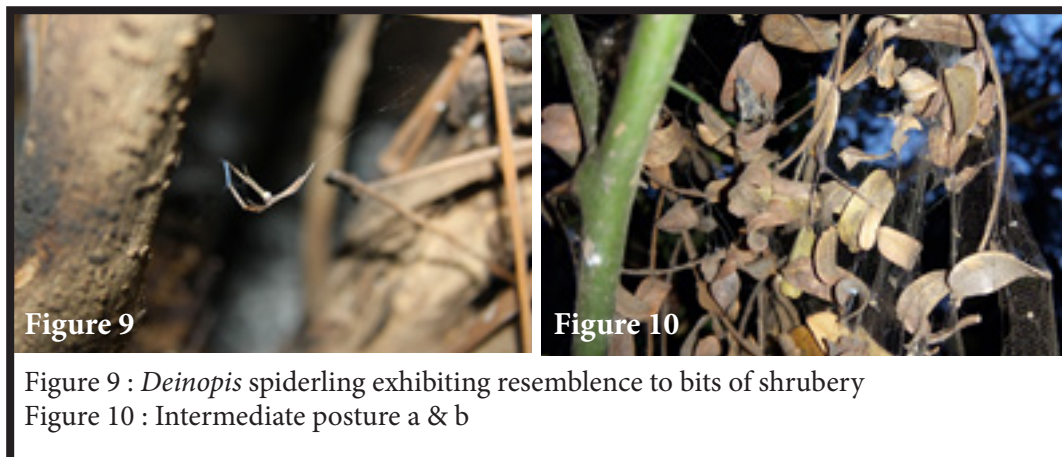


Figure 1: Hunting stance 1, Figure 2: Hunting stance 2, Figure 3: Debris mould utilised as diurnal resting place, Figure 4: *Deinopis* spiderling in the process of discarding its cribellate web pre-treat, Figure 5: *Deinopis* spiderling in the process of consuming its cribellate web before retreating for the day, Figure 6: *Deinopis* spiderling pressed flat against a twig, Figure 7: *Deinopis* spiderling suspended head downward in mid-air with legs extended away from the longitudinal axis of the body in four tight pairs forming a cross, Figure 8: *Deinopis* spiderling hanging head downward in midair, with legs I and II protracted and apposed in front and legs III and IV protracted and apposed behind the body to form a single linear stick.



Furthermore, spiderlings at other locations were found inhabiting varying levels in the undergrowth, ranging from less than 1 foot to 5 feet, from ground level.

CONCLUSION

The vast majority of members of the family Deinopidae remain understudied, in terms of their biology, natural history, distribution and ecology and while there have been some excellent efforts made globally (Coddington *et al.*, 2012; Leong and Foo, 2009; Getty and Coyle, 1996; Coddington and Sobrevila, 1987; Blest, 1978; Blest and Land, 1977), similar studies on Indian forms remain non-existent, owing in part, perhaps, to the excellent camouflaging abilities afforded by the unique morphology of these spiders, and further accentuated by a nocturnal lifestyle.

As suggested by Leong and Foo (2009), increased nocturnal surveys will go a long way in ensuring a better understanding of species distribution patterns, favored habitats, sex ratios and breeding biology, in addition to uncovering further species new to science.

ACKNOWLEDGEMENTS

The authors would like to express their heartfelt gratitude for the works of Mr. Reginald Innes Pocock and Dr. B. K. Tikader; pioneers of Indian Arachnology, whose respective works on the subject remain indispensable as unmatched classics.

Dr. B. F. Chhapgar, marine biologist emeritus, Mr. Kiran Khalap, author and rock climber extraordinaire and Mr. Sunjoy Monga, honorary wildlife warden, Mumbai; exceptional naturalist and ornithologist par excellence, took a keen interest in our natural history observations and discoveries, and their kind help and unfailing support over the years is deeply appreciated.

Nicky Bay, avid naturalist and outstanding macro photographer, and John Caleb, prodigious arachnologist, are thanked for the many wonderful discussions held on the subject.

Mr. Rahul Khot, entomologist and curator, Bombay Natural History Society is acknowledged for his kind assistance.

REFERENCES

- Blest, A. D. and M. F. Land. 1977. The Physiological optics of *Dinopis subrufus* L. Koch: A fish-lens in a spider. *Proceedings of the Royal Society, London (Ser. B)*, 200: 463-483.
- Blest, A. D. 1978. The rapid synthesis and destruction of photoreceptor membrane by a Dinopid spider: A daily cycle. *Proceedings of the Royal Society, London (Ser. B.)*, 200: 463-483.
- July 2015, *Indian Journal of Arachnology*, 4(1).....047

- Coddington, J. and C. Sobrevila. 1987. Web manipulation and two stereotyped attack behaviors in the ogre-faced spider *Deinopis spinosus* Marx (Araneae, Deinopidae), *Journal of Arachnology*, 15: 213-225.
- Coddington, J. A., M. Kuntner and B. D. Opell. 2012. Systematics of the spider family Deinopidae with a revision of the genus *Menneus*, Smithsonian contribution to Zoology. *Smithsonian Institution Scholarly Press*, No. 636, 61 pp.
- Caleb, J. T. D and M. T. Mathai. 2014. A New Species of *Deinopis* MacLeay (Araneae: Deinopidae) from India. *Indian Society of Arachnology*, 3 (1): 1-7.
- Dhamorikar, A. and K. Gore. 2014. A Preliminary assessment of the diversity and ecosystem preference of spider families (Arachnida: Araneae) occurring in Kanha Tiger Reserve. National Symposium cum Workshop on Diversity of Spiders with special reference to *Taxonomy & Molecular Systematics*. ISBN: 978-81-929160-5-7.
- Getty, R. M. and F. A. Coyle. 1996. Observations on prey capture and anti-predator behaviors of ogre-faced spiders (*Deinopis*) in Southern Costa Rica (Araneae, Deinopidae). *Journal of Arachnology*, 24: 93-100.
- Koch, C. L. 1850. Übersicht des Arachnidensystems. *Nürnberg, Heft 5*, pp 1-77.
- Leong, T. M. and S. K. Foo. 2009. An encounter with the net casting spider, *Deinopis* species in Singapore (Araneae: Deinopidae). *Nature in Singapore*, 2: 247-255.
- MacLeay, W. S. 1839. On some new forms of Arachnida. *Annals of Natural History*, 2: 1-14.
- Simon, E. 1876. Etude sur le arachnides du Congo. *Bulletin de la Société Zoologique de France*, 1: 12-15, 215-224.
- Tikader, B. K. and M. S. Malhotra. 1978. A new record of rare spider of the family Dinopidae from India with description of a new species. *Proceedings of the Indian Academy of Science*, 87(B): 157-159.
- World Spider Catalog. 2015. World Spider Catalog. Natural History Museum Bern, online at <http://wsc.nmbe.ch>, version 16, accessed on 5/7/2015.